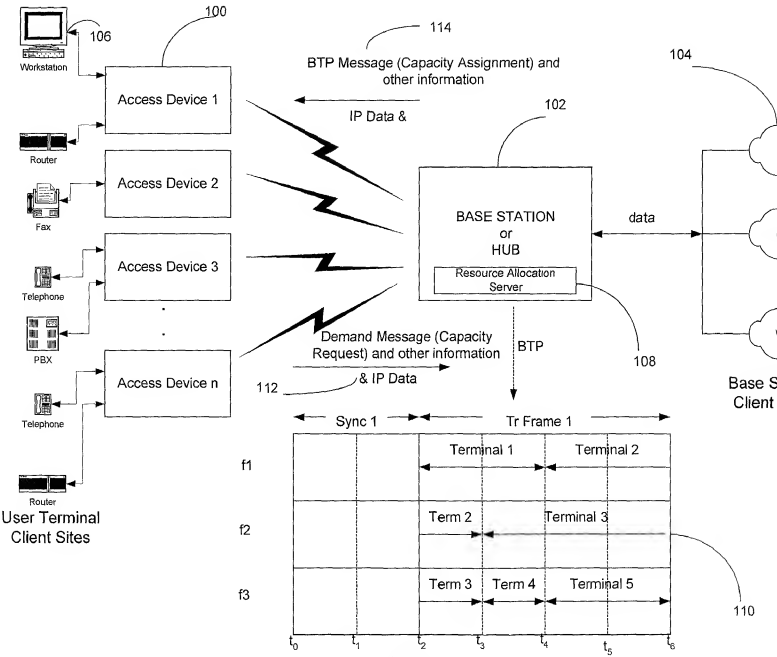
100
106
Workstation
Access Device 1
Router
Access Device 2
Fax
Access Device 3
Telephone
PBX
Access Device n
Telephone
Router
User Terminal
Client Sites
114
BTP Message (Capacity Assignment) and
other information
IP Data &
102
BASE STATION
or
HUB
Resource Allocation
Server
data
104
LAN
PSTN
WWW
Base Station
Client Sites
Demand Message (Capacity
Request) and other information
& IP Data
112
BTP
108
Sync 1
Tr Frame 1
f1
f2
f3
Terminal 1
Terminal 2
Term 2
Terminal 3
Term 3
Term 4
Terminal 5
110
t0
t1
t2
t3
t4
t5
t6

Figure 1

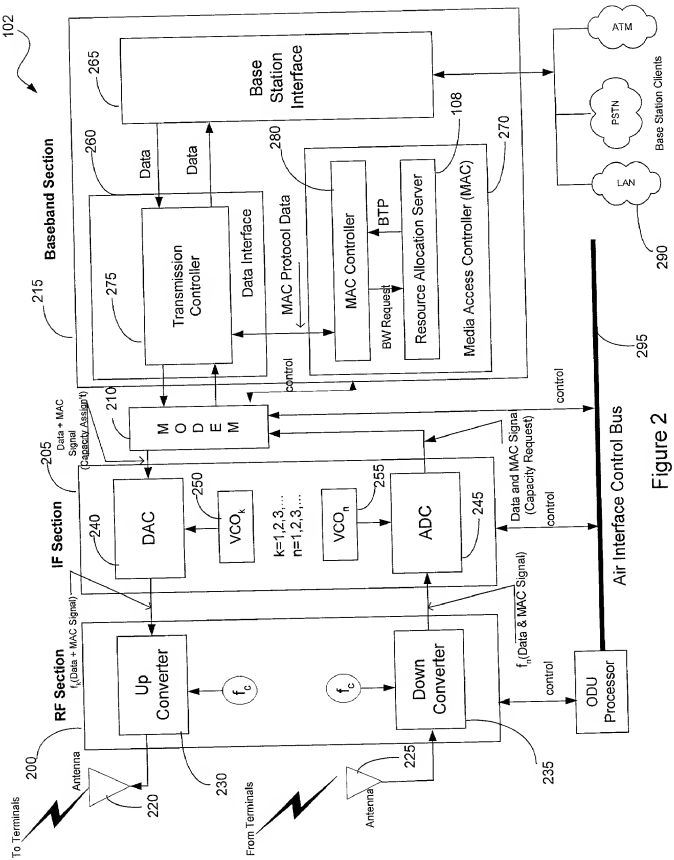
102
Baseband Section
215
Base Station Interface
265
260
Data
Data
Transmission Controller
275
Data Interface
MAC Protocol Data
280
MAC Controller
BW Request
BTP
Resource Allocation Server
108
Media Access Controller (MAC)
270
ATM
PSTN
LAN
Base Station Clients
290
control
control
MODEM
210
205
Data + MAC Signal (Capacity Assign't)
IF Section
240
DAC
250
VCO_k
k=1,2,3,...
n=1,2,3,...
VCO_n
255
ADC
245
Data and MAC Signal (Capacity Request)
control
RF Section
f_c (Data + MAC Signal)
200
Antenna
220
Up Converter
230
f_c
f_c
Down Converter
225
235
f_n (Data & MAC Signal)
control
ODU Processor
Air Interface Control Bus
295
To Terminals
From Terminals
Antenna

Figure 2

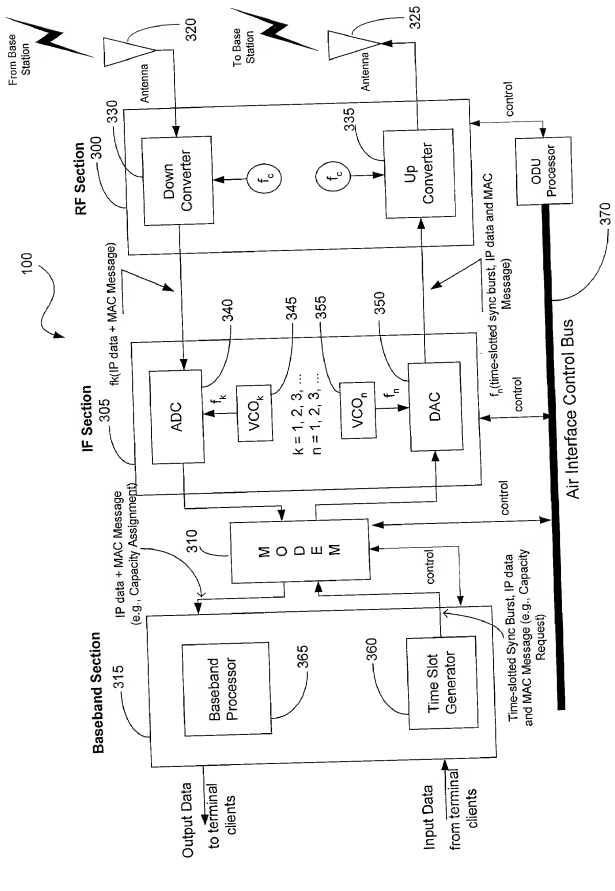
From Base Station
Antenna
320
To Base Station
Antenna
325
RF Section
300
330
Down Converter
f_c
f_c
335
Up Converter
control
ODU Processor
370
100
IF Section
305
fk(IP data + MAC Message)
340
ADC
f_k
VCO_k
345
k = 1, 2, 3, ...
n = 1, 2, 3, ...
355
VCO_n
f_n
350
DAC
f_n(time-slotted sync burst, IP data and MAC Message)
control
control
control
Air Interface Control Bus
IP data + MAC Message (e.g., Capacity Assignment)
310
MODEM
Baseband Section
315
Baseband Processor
365
360
Time Slot Generator
Time-slotted Sync Burst, IP data and MAC Message (e.g., Capacity Request)
Output Data to terminal clients
Input Data from terminal clients

Figure 3

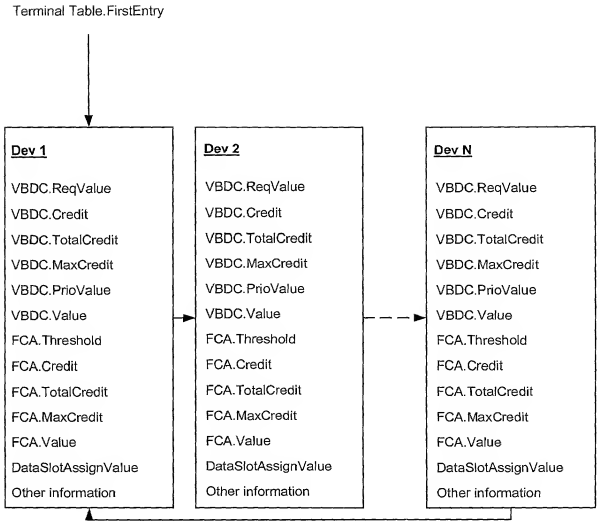
Terminal Table.FirstEntry
Dev 1
VBDC.ReqValue
VBDC.Credit
VBDC.TotalCredit
VBDC.MaxCredit
VBDC.PrioValue
VBDC.Value
FCA.Threshold
FCA.Credit
FCA.TotalCredit
FCA.MaxCredit
FCA.Value
DataSlotAssignValue
Other information
Dev 2
VBDC.ReqValue
VBDC.Credit
VBDC.TotalCredit
VBDC.MaxCredit
VBDC.PrioValue
VBDC.Value
FCA.Threshold
FCA.Credit
FCA.TotalCredit
FCA.MaxCredit
FCA.Value
DataSlotAssignValue
Other information
Dev N
VBDC.ReqValue
VBDC.Credit
VBDC.TotalCredit
VBDC.MaxCredit
VBDC.PrioValue
VBDC.Value
FCA.Threshold
FCA.Credit
FCA.TotalCredit
FCA.MaxCredit
FCA.Value
DataSlotAssignValue
Other information

Fig. 4

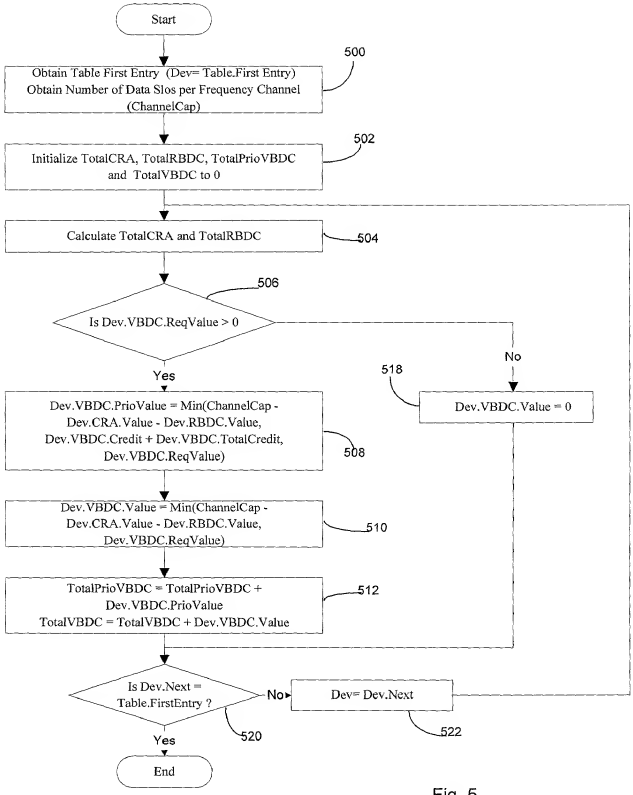
Start
Obtain Table First Entry (Dev= Table.First Entry)
Obtain Number of Data Slos per Frequency Channel (ChannelCap)
500
Initialize TotalCRA, TotalRBDC, TotalPrioVBDC and TotalVBDC to 0
502
Calculate TotalCRA and TotalRBDC
504
Is Dev.VBDC.ReqValue > 0
506
Yes
No
Dev.VBDC.PrioValue = Min(ChannelCap - Dev.CRA.Value - Dev.RBDC.Value, Dev.VBDC.Credit + Dev.VBDC.TotalCredit, Dev.VBDC.ReqValue)
508
Dev.VBDC.Value = Min(ChannelCap - Dev.CRA.Value - Dev.RBDC.Value, Dev.VBDC.ReqValue)
510
TotalPrioVBDC = TotalPrioVBDC + Dev.VBDC.PrioValue
TotalVBDC = TotalVBDC + Dev.VBDC.Value
512
518
Dev.VBDC.Value = 0
Is Dev.Next = Table.FirstEntry ?
520
No
Yes
Dev= Dev.Next
522
End

Fig. 5

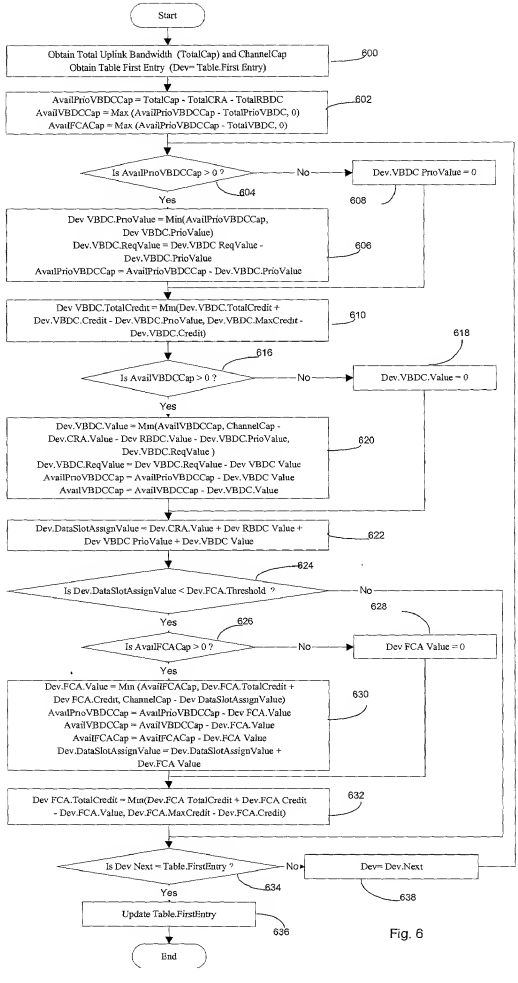
Start
Obtain Total Uplink Bandwidth (TotalCap) and ChannelCap
Obtain Table First Entry (Dev= Table.First Entry)
600
AvailPrioVBDCCap = TotalCap - TotalCRA - TotalRBDC
AvailVBDCCap = Max (AvailPrioVBDCCap - TotalPrioVBDC, 0)
AvailFCACap = Max (AvailPrioVBDCCap - TotalVBDC, 0)
602
Is AvailPrioVBDCCap > 0 ?
No
Dev.VBDC PrioValue = 0
608
Yes
604
Dev VBDC.PrioValue = Min(AvailPrioVBDCCap, Dev VBDC.PrioValue)
Dev.VBDC.ReqValue = Dev.VBDC ReqValue - Dev.VBDC.PrioValue
AvailPrioVBDCCap = AvailPrioVBDCCap - Dev.VBDC.PrioValue
606
Dev VBDC.TotalCredit = Min(Dev.VBDC.TotalCredit + Dev.VBDC.Credit - Dev.VBDC.PrioValue, Dev.VBDC.MaxCredit - Dev.VBDC.Credit)
610
618
616
Is AvailVBDCCap > 0 ?
No
Dev.VBDC.Value = 0
Yes
Dev.VBDC.Value = Min(AvailVBDCCap, ChannelCap - Dev.CRA.Value - Dev RBDC.Value - Dev.VBDC.PrioValue, Dev.VBDC.ReqValue)
Dev.VBDC.ReqValue = Dev VBDC.ReqValue - Dev VBDC Value
AvailPrioVBDCCap = AvailPrioVBDCCap - Dev.VBDC Value
AvailVBDCCap = AvailVBDCCap - Dev.VBDC.Value
620
Dev.DataSlotAssignValue = Dev.CRA.Value + Dev RBDC Value + Dev VBDC PrioValue + Dev.VBDC Value
622
624
Is Dev.DataSlotAssignValue < Dev.FCA.Threshold ?
No
628
Yes
626
Is AvailFCACap > 0 ?
No
Dev FCA Value = 0
Yes
Dev.FCA.Value = Min (AvailFCACap, Dev.FCA.TotalCredit + Dev FCA.Credit, ChannelCap - Dev DataSlotAssignValue)
AvailPrioVBDCCap = AvailPrioVBDCCap - Dev FCA.Value
AvailVBDCCap = AvailVBDCCap - Dev.FCA.Value
AvailFCACap = AvailFCACap - Dev.FCA Value
Dev.DataSlotAssignValue = Dev.DataSlotAssignValue + Dev.FCA Value
630
Dev FCA.TotalCredit = Min(Dev.FCA TotalCredit + Dev.FCA Credit - Dev.FCA.Value, Dev.FCA.MaxCredit - Dev.FCA.Credit)
632
Is Dev Next = Table.FirstEntry ?
No
Dev= Dev.Next
634
638
Yes
Update Table.FirstEntry
636
End

Fig. 6

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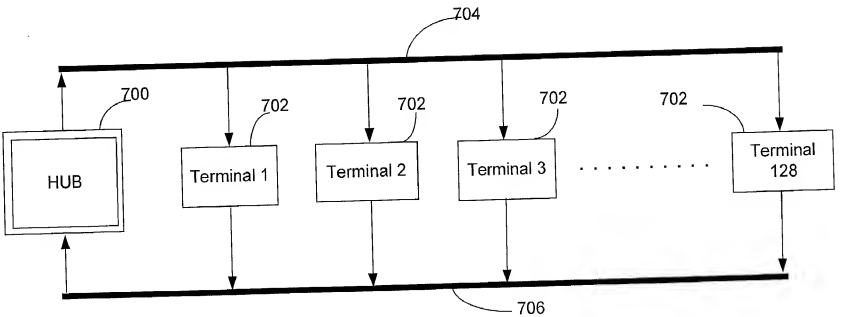

Fig. 7

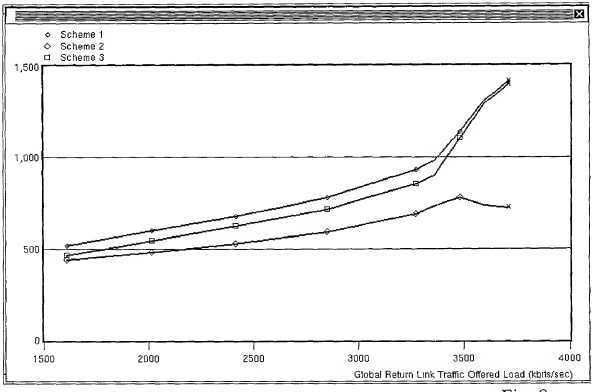
Scheme 1
Scheme 2
Scheme 3
1,500
1,000
500
0
1500
2000
2500
3000
3500
4000
Global Return Link Traffic Offered Load (kbits/sec)

Fig. 8

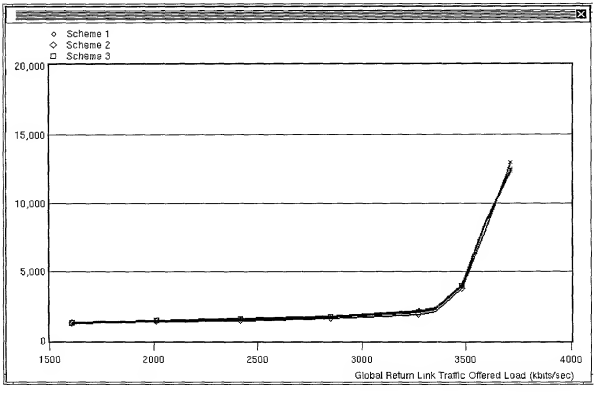
Scheme 1
Scheme 2
Scheme 3
20,000
15,000
10,000
5,000
0
1500
2000
2500
3000
3500
4000
Global Return Link Traffic Offered Load (kbits/sec)

Fig. 9

Loads (kbits/sec)	Average Access Delay of High-Priority Data Packets (msec)		
	Method 1	Method 2	Method 3
1608.42	270.59	191.59	216.1
2011.03	348.65	233.52	294.54
2413.88	427.47	277.77	373.70
2847.56	525.78	339.62	464.94
3272.14	682.31	437.51	600.23
3356.28	726.08	480.13	648.59
3479.69	893.65	527.56	854.18
3595.08	1062.48	484.59	1044.24
3714.44	1165.45	472.87	1151.17

Fig. 10

Loads (kbits/sec)	Average Access Delay of Low-Priority Data Packets (msec)		
	Method 1	Method 2	Method 3
1608.42	1114.18	1053.44	1071.35
2011.03	1234.59	1138.32	1202.86
2413.88	1364.27	1241.64	1334.74
2847.56	1547.28	1378.27	1513.48
3272.14	1935.08	1656.07	1852.20
3356.28	2151.55	1859.12	2059.55
3479.69	3812.93	3562.25	3691.50
3595.08	8417.75	7835.54	8311.45
3714.44	12246.85	12750.38	12140.83

Fig. 11

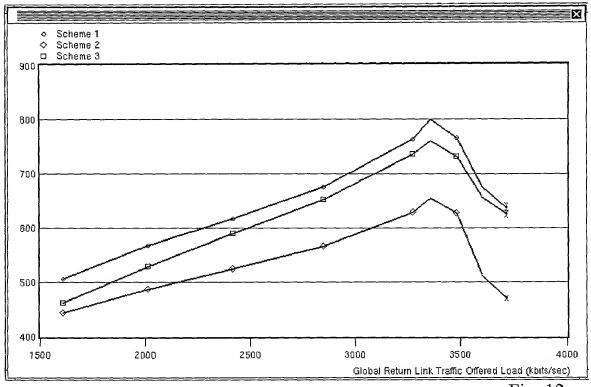
Scheme 1
Scheme 2
Scheme 3
900
800
700
600
500
400
1500
2000
2500
3000
3500
4000
Global Return Link Traffic Offered Load (kbits/sec)

Fig. 12

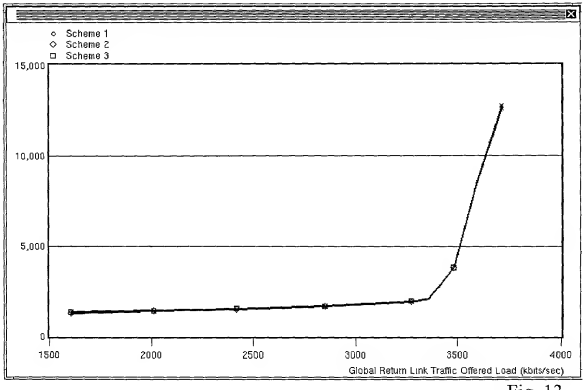
Scheme 1
Scheme 2
Scheme 3
15,000
10,000
5,000
0
1500
2000
2500
3000
3500
4000
Global Return Link Traffic Offered Load (kbits/sec)

Fig. 13

Loads (kbits/sec)	Average Access Delay of High Priority Data Packets (msec)		
	Method 1	Method 2	Method 3
1608.42	253.51	190.75	208.79
2011.03	315.25	233.91	275.57
2413.88	365.66	271.72	337.85
2847.56	423.50	313.95	399.85
3272.14	511.76	376.30	483.51
3356.28	547.92	402.44	580.05
3479.69	514.79	374.69	479.41
3595.08	425.41	260.85	405.71
3714.44	384.87	217.49	373.01

Fig. 14

Loads (kbits/sec)	Average Access Delay of Low Priority Data Packets (msec)		
	Method 1	Method 2	Method 3
1608.42	1131.58	1072.20	1081.51
2011.03	1220.10	1178.51	1197.78
2413.88	1316.91	1279.67	1300.77
2847.56	1455.77	1410.12	1448.28
3272.14	1713.14	1667.59	1707.30
3356.28	1885.89	1861.12	1878.72
3479.69	3608.49	3596.70	3584.57
3595.08	8282.59	8330.28	8298.04
3714.44	12372.45	12507.22	12382.02

Fig. 15